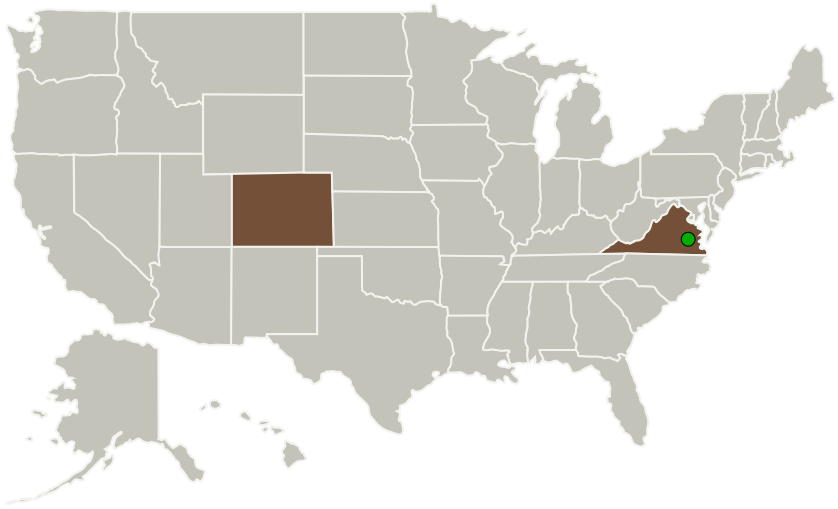
Spirally Stowed Architecture for Large Photovoltaic Arrays, Phase II

Completed Technology Project (2015 - 2017)

Project Introduction

Proposed is the development and validation in a laboratory environment of a photovoltaic (PV) array design of unique and enabling characteristics. Namely, smoothly deployed from compact stowage with one single, continuous sweep of motion, a total PV surface area up to and beyond 4000~m2 (the area associated with 1~MW power) is provided by two wings, with mechanical performance objectives also met. The PV cells are mounted on flexible strups that, assembled, constitute array disk pie segments between straight ribs and smoothly wrap between the latter on the central hub for stowage. The surface shears in stowage effected by this kinematics are absorbed by shear compliant hinge strips between the strips, and the PV cells are mounted on the latter ro precisely align in the roll. Deployed, the surface segments between the ribs are pretensioned with catenaries on the outer perimeter, supported by the rib tips which extend outward. A full mechanical design is developed to complete concept validation for a pair of wings 2000 m2 each, fabrication and operational issues are explored and addressed, and a working prototype wing is built to complete concept validation.

Primary U.S. Work Locations and Key Partners



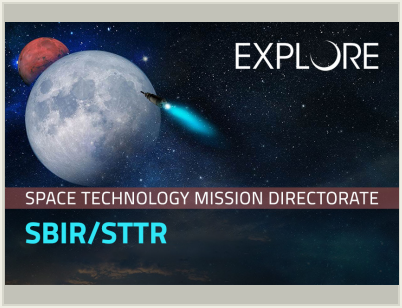


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
TentGuild Engineering Company	Lead Organization	Industry	Boulder, Colorado
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Colorado	Virginia

Project Transitions

June 2015: Project Start

May 2017: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140642)*

Images

Briefing Chart
Spirally Stowed Architecture for Large Photovoltaic Arrays Briefing Chart
(https://techport.nasa.gov/image/127103)

Final Summary Chart Image
Spirally Stowed Architecture for Large Photovoltaic Arrays, Phase II Project Image
(https://techport.nasa.gov/image/130032)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
TentGuild Engineering Company

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

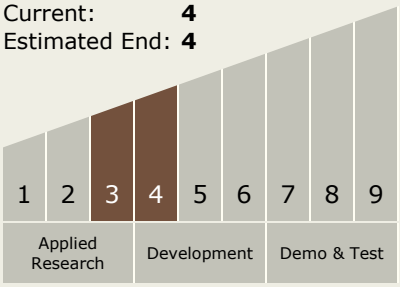
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Gyula I Greschik

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.1 Lightweight Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System